LOWER PENITENCIA & PENITENCIA EAST

A previous engineer's report describing proposed flood control improvements was adopted for the Lower Penitencia project (not for Penitencia East Channel) on August 6, 1956. This appendix of the East Zone Planning Study revises the earlier report and describes the proposed flood control works needed for Lower Penitencia Creek and Penitencia East Channel and incorporates the latest design criteria and policies.

TC
425
P45.M3
1973
c.2
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WATERSHED DESCRIPTION

Lower Penitencia Creek

Lower Penitencia Creek is located in the northeasterly sector of Santa Clara County and is bounded by Berryessa Creek to its east and Coyote Creek to its west. It flows northerly to its confluence with Coyote Creek near the intersection of Highway 17 and Dixon Landing Road. Waters flow from its tributary areas that vary from 2500 feet above Mean Sea Level to sea level at the confluence with Coyote Creek. The major portion of its tributary area lies in the unincorporated area of the County with the lower portion of the creek flowing through the City of Milpitas.

The Lower Penitencia Creek watershed is rectangular in shape, having a length of about 7.8 miles in the east-west direction and a width of about 7.4 miles in the north-south direction. The total watershed area is about 28 square miles with about 16 square miles lying on the valley floor with the remainder in the hills of the Diablo Range and is shown on sheet 2.

The valley floor, once used extensively for agricultural purposes, is being developed into light industrial, commercial and residential use. It is conceivable that about eighty percent of the watershed will eventually be urbanized.

The soils on the steeper portion of the watershed consist predominantly of adobe clay and gravelly clay type soils. A considerable portion of the hilly area is underlain with serpentine hardpan, which induces slides and causes relatively rapid return of any infiltrated flow to the stream channels. In the central portion of the watershed the soil is predominantly of a clay loam type, while in the flatter areas of the lower part of the watershed the soil is predominantly of a clay type. These soils have a relative low permeability and therefore the rate of runoff is high.

Native growth in the hills of the eastern portion of the watershed consists of scattered oak, madrone, and bay trees with underlying brush and grass. This type of vegetation is effective in reducing the runoff for low rainfall intensities but has little effect on the higher intensity rainfall which produces the design floods.

Penitencia East Channel

Penitencia East Channel is located between the Southern Pacific Railroad and Trimble Road in the City of Milpitas. It flows in a westerly direction to its confluence with Lower Penitencia Creek adjacent to the Southern Pacific Railroad.

The major portion of the watershed is located within the City of San Jose on the valley floor and is shown on sheet 2. Waters are transported from the tributary areas to the flood control channel by an extensive storm drain system that has been constructed to control runoff in the urban areas.

The Penitencia East Channel watershed is long and narrow, having a width of about 1.3 miles in the east-west direction and a length of about 2.3 miles in the north-south direction. The total watershed area is about 1450 acres.

The valley floor, once used extensively for agricultural purposes, is being developed into light industrial, commercial, and residential use. It is possible that in time the entire watershed will be urbanized.

The soils of the watershed are predominantly clays and clayey loam. The permeability of these soils is relatively low and therefore the rate of runoff is high.

FLOODING PROBLEMS

Lower Penitencia Creek has inadequate capacity to carry its design flow except for a short reach of improved channel that lies between Spence Avenue and Main Street. Tidal action coupled with moderate flows will overtop the existing levees below Tract No. 2680. The channel that passes through the existing subdivision could overtop the existing levees under the design discharge and extensive flooding could occur.

Above Main Street nothing more than a depression exists to form the channels of Lower Penitencia Creek and Penitencia East Channel. Moderate flows in this reach will cause flooding of the adjacent areas which presently are sparsely developed.

DESIGN FLOWS

In the channel design, the capacity of the channel is set to provide an equivalent level of protection from flooding. This level, the design flood, is set at the one-percent flood; that is, the flood that can be expected to be equaled or exceeded once in 100 years (see table I).

TABLE I

Reach No.	Station	Design Reach	Watershed Area In Acres	Design(1) Peak Flow (cfs)
1 - 7	0+00-48+00	Confluence with Coyote Creek to Confluence with Berryessa Creek	17,920	5,000
8	48+00-67+50	Confluence with Berryessa Creek to Redwood Avenue		1,300
9 - 10	67+50-111+40	Redwood Avenue to Spence Ave.		1,090
11	3+05-20+00	Main Street to Confluence with East Channel		830
12	20+00-34+20	Confluence with East Channel to Trimble Road		300
PENITENCIA EAST CHANNEL				
1 - 4	20+00-55+80	Confluence with Lower Penitencia to Trimble Road	1,450	530

(1) At downstream location of reach.

PROPOSED IMPROVEMENTS

Lower Penitencia Creek

The proposed improvements to Lower Penitencia Creek extend over a length of about 14,000 feet and include a trapezoidal earth channel section, a portion of which will be supplemented by a reinforced concrete floodwall. These proposed improvements are illustrated in plan and profile on sheets 3 through 10.

The existing channel from the confluence with Coyote Creek to Spence Avenue is inadequate to carry the design flood. The reach from the confluence with Coyote Creek to the confluence with Berryessa Creek will be improved with an unlined trapezoidal section with the exception that the section through Nimitz Freeway will be concrete lined. The proposed right of way through this reach is 196 feet wide. Above the confluence with Berryessa to the existing Curtner Estates subdivision the existing levees must be raised approximately three feet to insure adequate capacity during high flood flows. The additional right of way required to raise the levees is 29 feet making the total proposed right of way 129 feet wide.

Through the subdivisions to Spence Avenue, the existing levees are inadequate with no right of way available to raise them. In order to provide the required capacity, low concrete flood walls will be constructed at the top of bank.

The reach from Spence Avenue to Main Street is adequate to carry the design flood.

Above Main Street an interim inadequate channel has been constructed to direct local storm drain runoff to the main channel of Lower Penitencia Creek. The inadequate channel will be replaced with an earth trapezoidal section that will have the capacity to carry the design flood flow. The channel will extend from the existing structure at Main Street and Capitol Avenue to Trimble Road running adjacent to the Southern Pacific Railroad. The channel will terminate at Trimble Road where it will connect to the City of San Jose's storm drain system. No additional right of way is required through the above reach.

Penitencia East Channel

Penitencia East Channel confluences with Lower Penitencia Creek midway between Capitol Avenue and Trimble Road adjacent to the Southern Pacific Railroad. An existing interim channel traverses in an easterly direction crossing Montague Expressway continuing easterly then swinging south to its terminus adjacent to Trimble Road where it connects with the Capitol Avenue storm drain.

The proposed improvement of Penitencia East Channel calls for the construction of an earth channel, drop structures, box culverts and a pipeline. The improvements extend over about 3,600 feet and are illustrated in plan and profile on sheets 10 and 11.

The reach from the confluence to westerly of Montague Expressway will be an earth trapezoidal section constructed to match grade with Lower Penitencia Creek at the confluence. A drop structure will be constructed just below Montague Expressway in order to reduce the velocity of flow to prevent erosion. Above the drop the channel intersects Montague Expressway. The existing box culvert under the expressway must be extended in order to provide adequate bridging for the expressway.

Above the box, the channel will return to an earth trapezoidal section and be extended about 700 feet upstream to a drop box culvert structure that will function to pass the flow beneath an existing gas main. Above the gas main the earth channel will be resumed and continued another 700 feet where it will transition to a large pipe. The pipe will extend about 300 feet to its terminus at the existing Capitol storm drain outfall.

No additional right of way is required for the construction of the above improvement.

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No additional right of way is required for the construction of the above improvement.

ALTERNATIVES CONSIDERED

In the formulation process for the proposed flood control improvements on Lower Penitencia Creek and Penitencia East Channel, several alternatives were considered and evaluated. Among the alternatives was the floodplain concept and the modified floodplain concept. These alternatives result in a very wide right of way and channel cross section that may be utilized conjunctively by parks, trails and agriculture. Unfortunately, the use of these alternatives was not feasible due to development encroachment.

The do-nothing alternative has been considered, but has been determined to be impractical since this alternative would maintain the present hazardous flooding conditions and subject the developed areas to potential major damage and loss of life.

COST ESTIMATE

Estimates of the costs of construction of the proposed channel improvements on Lower Penitencia Creek and Penitencia East Channel were based on prevailing (1973) prices. In addition to the construction costs, a contingency item was estimated to account for the costs of engineering, advertising, legal fees and other incidentals. Cost of right of way that must be acquired is also included.

Since Lower Penitencia Creek between Main Street and Trimble Road is presently being constructed by the County Department of Public Works under a reimbursement agreement with the District, the costs for this reach are listed as construction costs only.

The estimated costs are presented in table II.

TABLE II

Station Limits	Construction	35% Engineering & Contingency	Land Acquisition	Total
Lower Penitencia Creek				
0+00–48+00	$329,000	$115,000	$125,000	$569,000
48+00–111+20	135,000	47,000	20,000	202,000
Main St. to Trimble Rd. (3+05–34+20)	70,000	–0–	38,000	108,000
Total	**$534,000**	**$162,000**	**$183,000**	**$879,000**
Penitencia East Channel				
20+00–55+40	$ 88,000	$ 31,000	–0–	$119,000
Total	**$ 88,000**	**$ 31,000**	–0–	**$119,000**

CONCLUSIONS

1. The existing creek channels in many places are incapable of containing all of the existing seasonal flows and incidence of flooding and resulting damage to downstream property will increase as urbanization of the Penitencia Creek watershed progresses.

2. The most desirable solution to the potential flood hazard on Lower Penitencia Creek is to construct a trapezoidal earth channel from the confluence with Coyote Creek to Tract No. 2680 and from Main Street to Trimble Road. Flood flows must be contained with low floodwalls through the existing subdivisions between Redwood Avenue and Spence Avenue.

3. Penitencia East Channel will be improved with a trapezoidal earth channel utilizing drop structures for gradient control. A box culvert will be constructed to carry the channel under existing Pacific Gas and Electric gas mains. A 78-inch pipe will be installed to carry the channel through a reach of extremely limited right of way.

4. The total estimated cost for the proposed improvement of Lower Penitencia Creek including construction, right of way and contingencies is $879,000.

5. The total estimated cost for the proposed improvement of Penitencia East Channel including construction, right of way and contingencies is $119,000.

6. An allowance of six percent of the construction costs for landscaping has been included in the estimated construction costs.

MAP AND GENERAL PLAN

FOR

LOWER PENITENCIA CREEK FROM COYOTE CREEK TO SPENCE ROAD

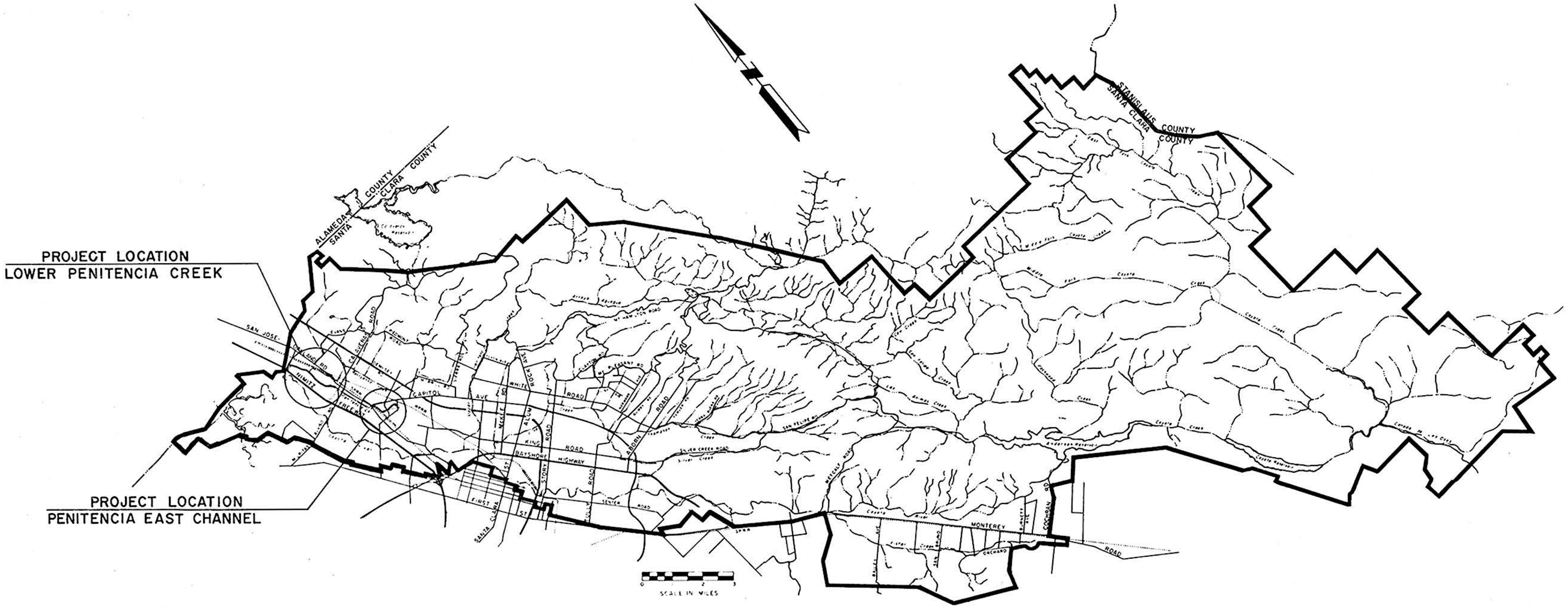
AND

PENITENCIA EAST CHANNEL FROM CAPITOL AVE. TO TRIMBLE ROAD

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

EAST FLOOD CONTROL ZONE E-1

PROJECT NO. 40033
AND
PROJECT NO. 40049



PROJECT LOCATION
LOWER PENITENCIA CREEK

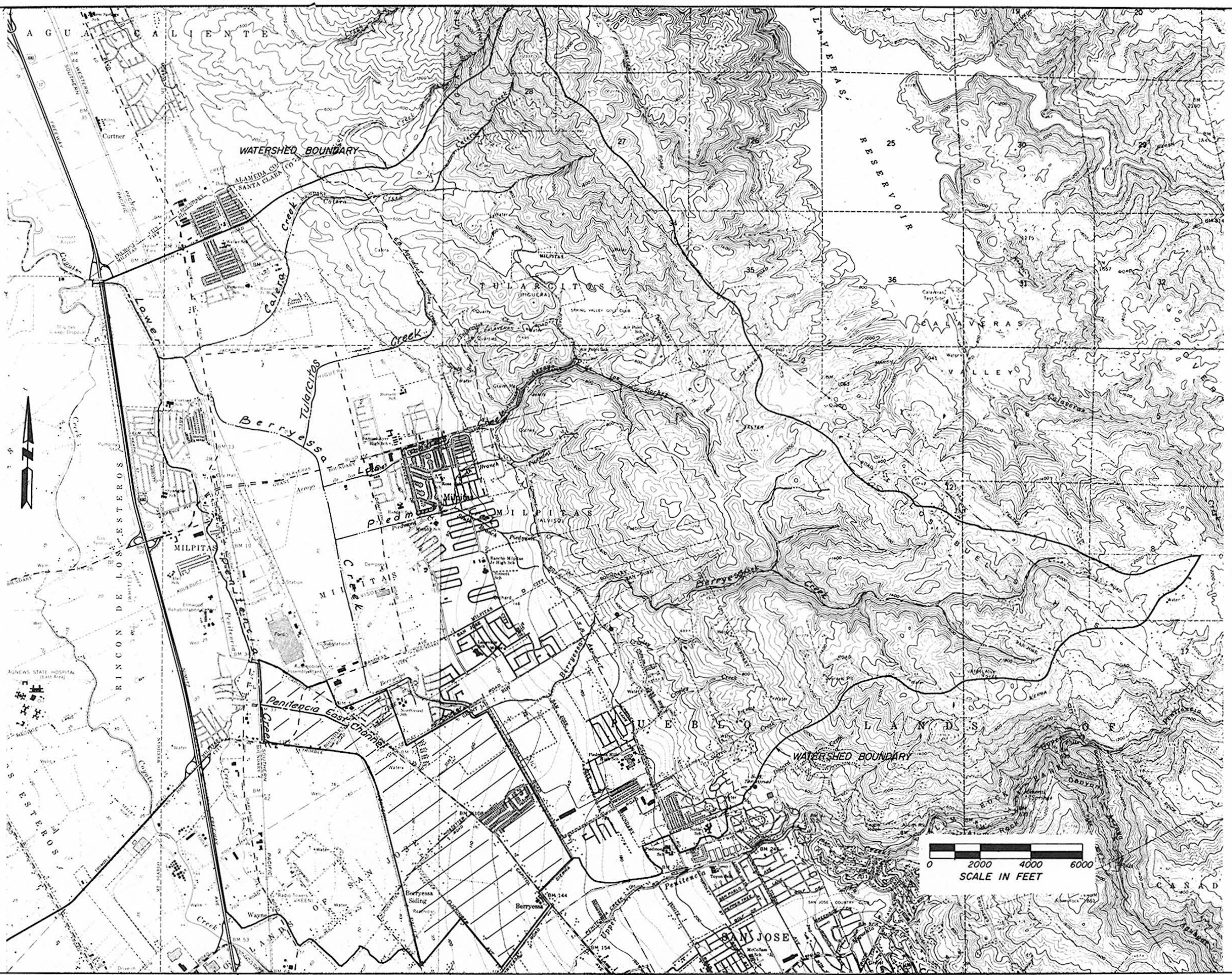
PROJECT LOCATION
PENITENCIA EAST CHANNEL

PROJECT APPROVAL:

George Korbay
DESIGN AND CONSTRUCTION MANAGER

Lloyd C. Fowler
CHIEF ENGINEER

DATE: Sept. 6, 1973



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REFERENCE INFORMATION AND NOTES

LEGEND

—·— PROJECT ROUTE

—— WATERSHED BOUNDARY

LOWER PENITENCIA CK. WATERSHED = 17,920 AC.

PENITENCIA EAST CHANNEL WATERSHED = 1,450 AC.

DATE 9-6-73
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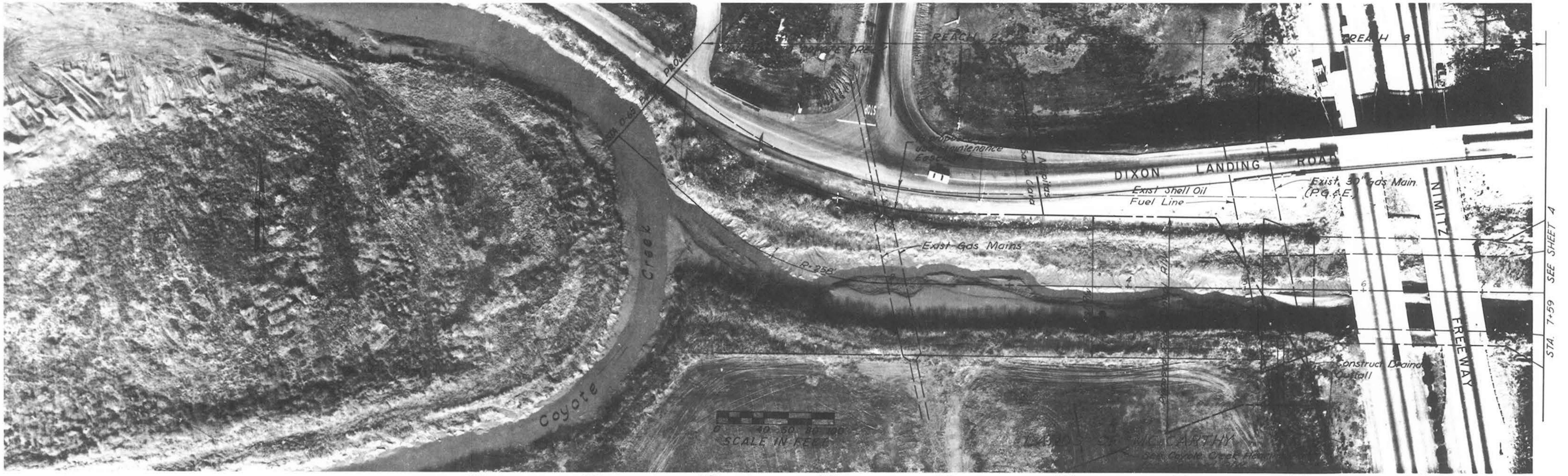
SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

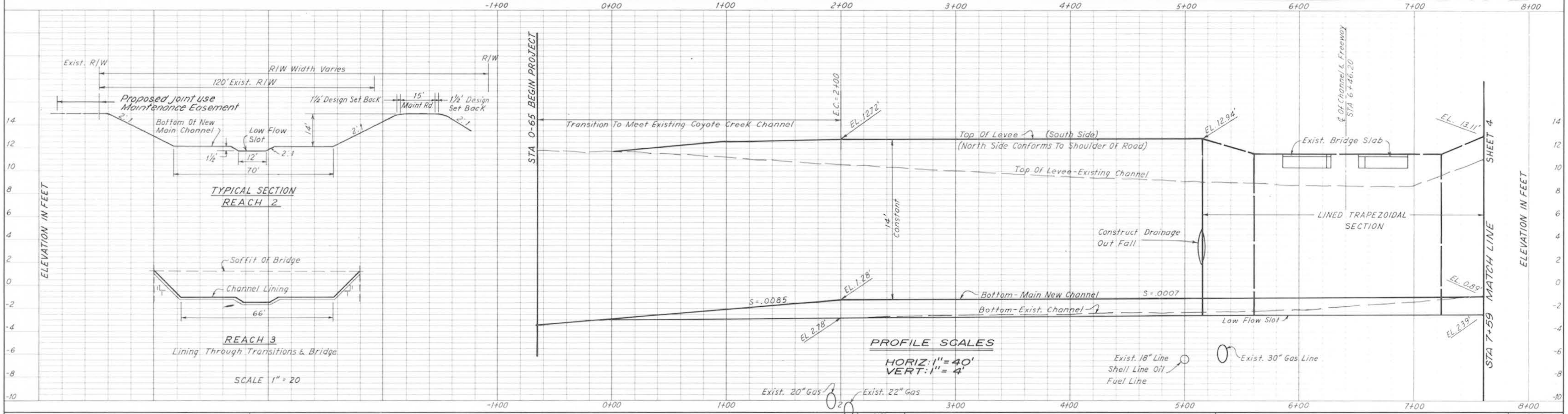
ENGINEERING CERTIFICATION
Robert Howard
PROJECT ENGINEER
DIVISION ENGINEER R.C.E. NO. 14455

ENGINEERING APPROVAL
Edwin Ferguson
DEPUTY DIRECTOR OF ENGINEERING R.C.E. NO. 13462

MAP AND GENERAL PLANS
ZONE E-1 (EAST) PROJECT NO. 40033
PENITENCIA CREEK (LOWER)
PENITENCIA EAST CHANNEL
WATERSHED

SCALE AS SHOWN
SHEET 2 of 11





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AND
WATER DISTRICT

ENGINEERING CERTIFICATION
Robert Howard
PROJECT ENGINEER
DIVISION ENGINEER R.C.E.

ENGINEERING APPROVAL
Edwin Ferguson
HEAD, DESIGN BRANCH R.C.E. NO. 14455

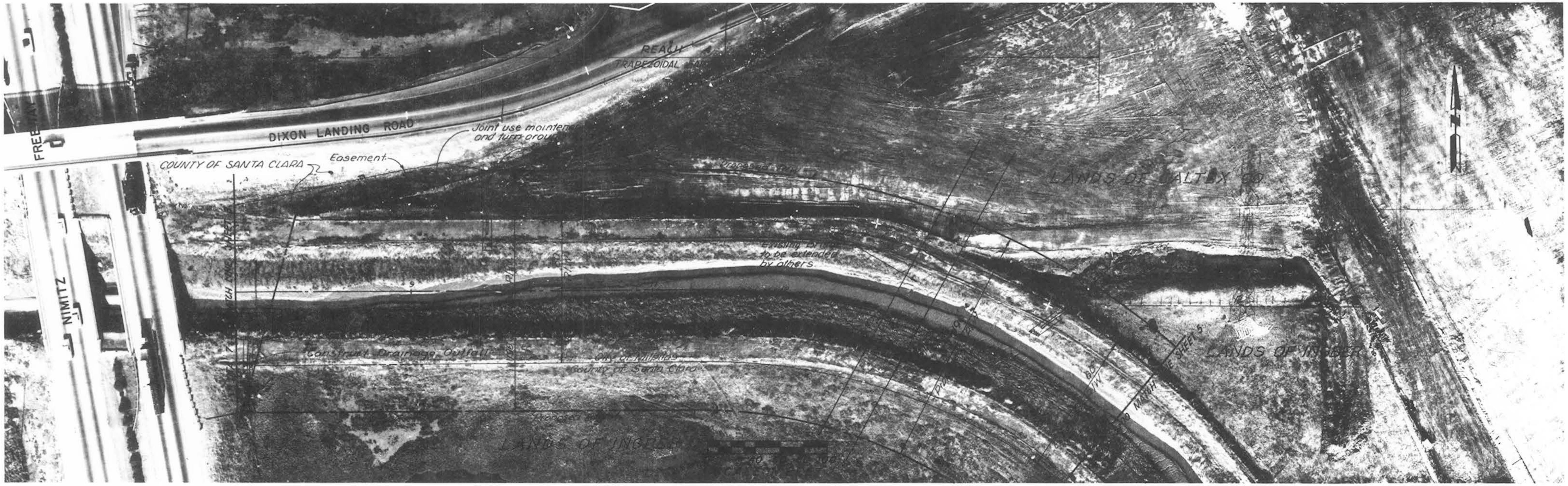
MAP AND GENERAL PLANS

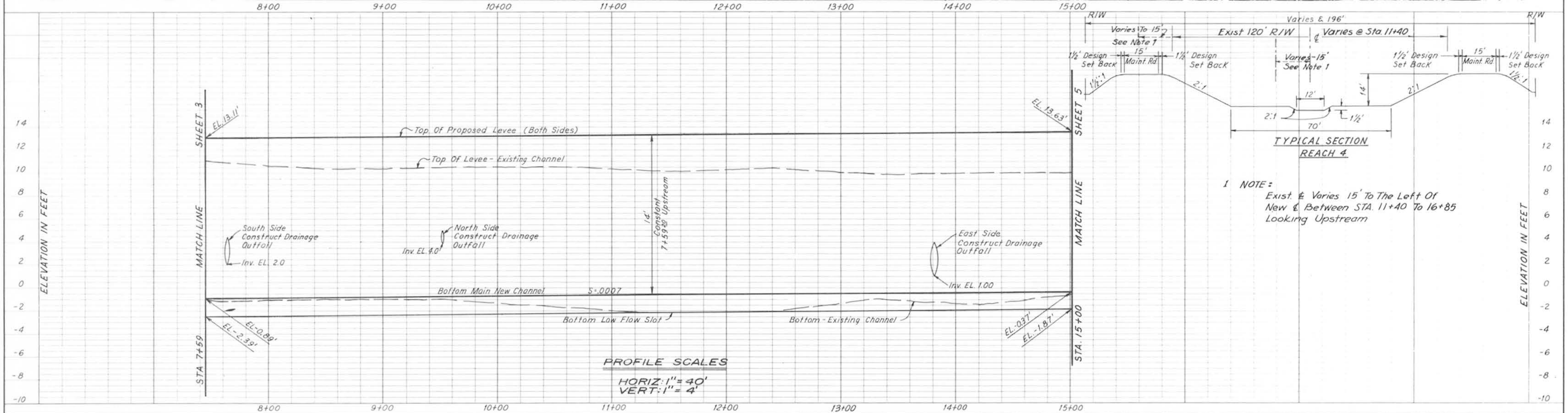
ZONE E-1 (EAST) PROJECT NO. 40033

PENITENCIA CREEK
(LOWER)

SCALE AS SHOWN

SHEET 3 of 11





PROFILE SCALES

HORIZ.: 1" = 40'
VERT.: 1" = 4'

1 NOTE:
Exist. ℄ Varies 15' To The Left Of New ℄ Between STA. 11+40 To 16+85 Looking Upstream

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Robert Howard
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DIVISION ENGINEER R.C.E.

ENGINEERING APPROVAL
Edwin Ferguson
HEAD, DESIGN BRANCH R.C.E. NO. 14455

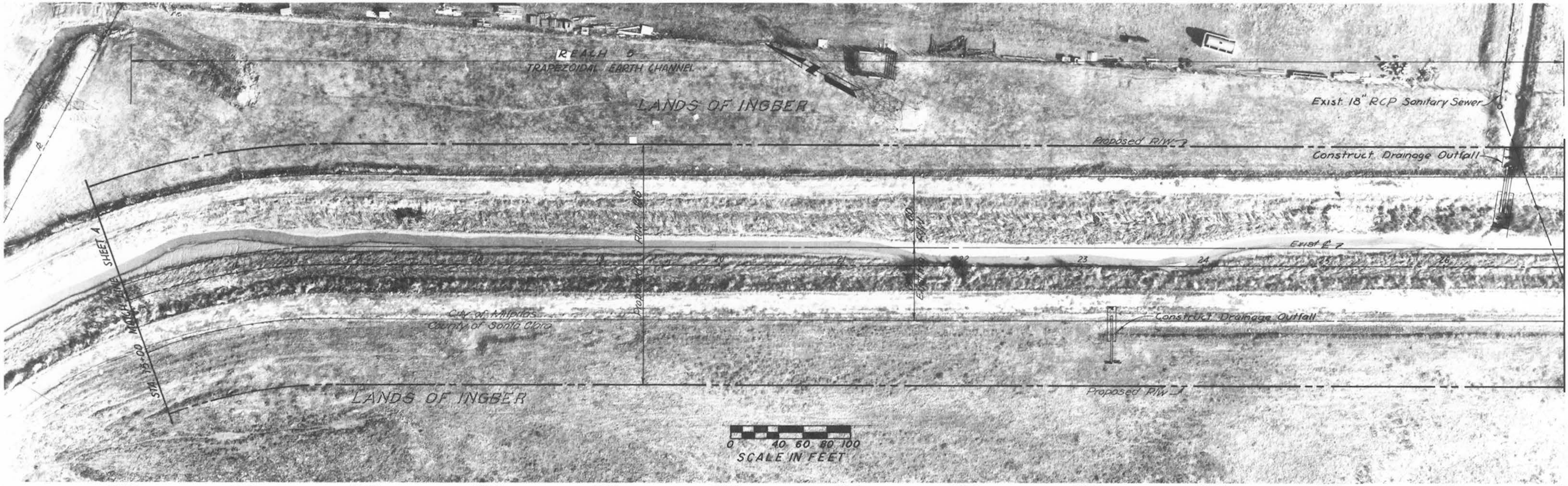
MAP AND GENERAL PLANS

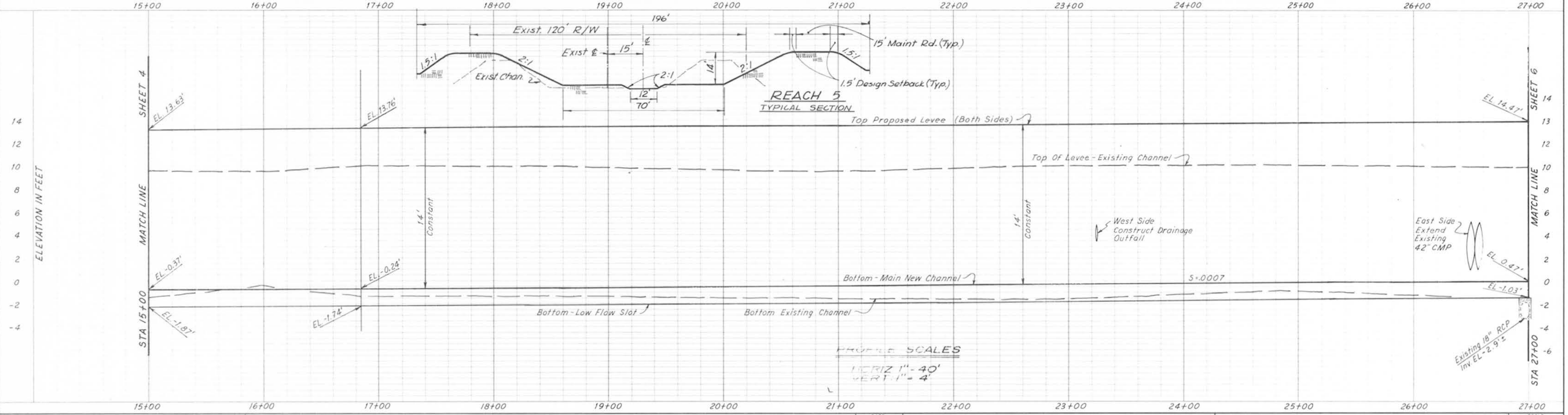
ZONE E-1 (EAST) PROJECT NO. 40033

PENITENCIA CREEK
(LOWER)

SCALE AS SHOWN

SHEET 4 of 11





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Edwin Ferguson
HEAD, DESIGN BRANCH R.C.E. NO. 14455

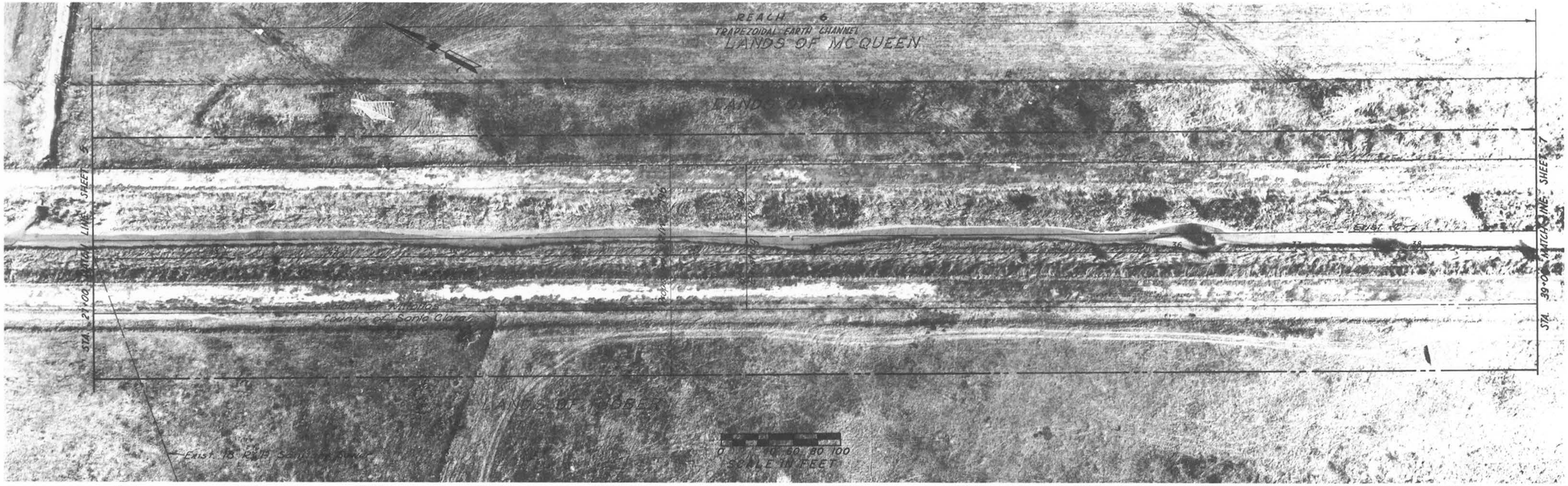
MAP AND GENERAL PLANS

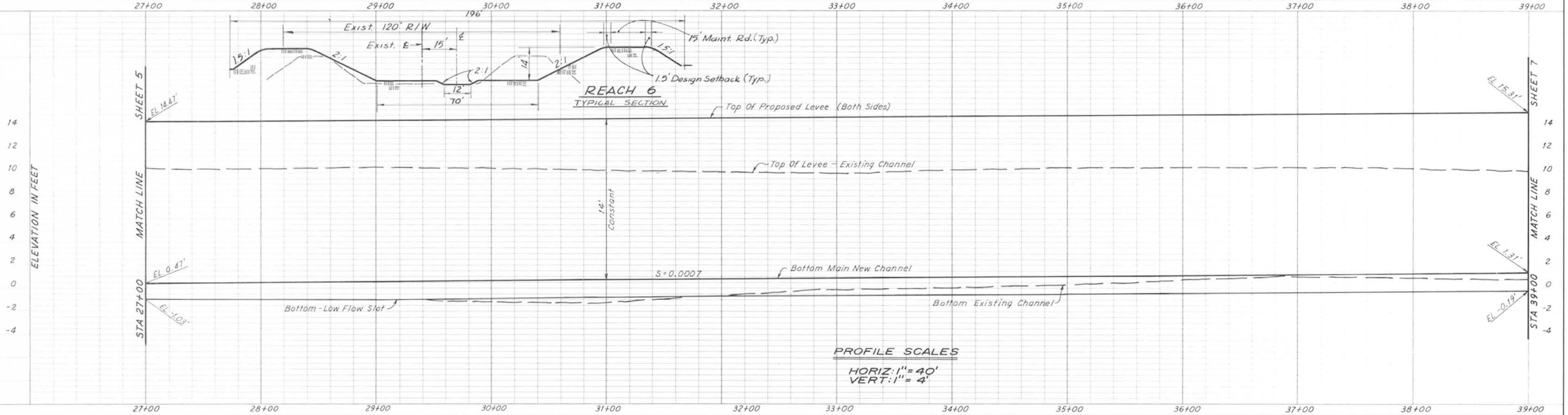
ZONE E-1 (EAST) PROJECT NO. 40033

PENITENCIA CREEK
(LOWER)

SCALE
AS SHOWN

SHEET
5
of 11


REACH 6
TRAPEZOIDAL EARTH CHANNEL
LANDS OF MCQUEEN
LANDS OF
STA. 27+00 MATCH LINE SHEET 5
City of Milpitas
County of Santa Clara
LANDS OF
Exist. 18' R/W Sanitary Sewer
0 20 40 60 80 100
SCALE IN FEET
Exist.
STA. 39+00 MATCH LINE SHEET 7



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SANTA CLARA COUNTY FLOOD CONTROL
AND
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ENGINEERING CERTIFICATION
Robert Howard
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DIVISION ENGINEER R.C.E.

ENGINEERING APPROVAL
Edwin Ferguson
HEAD, DESIGN BRANCH R.C.E. NO. 14455

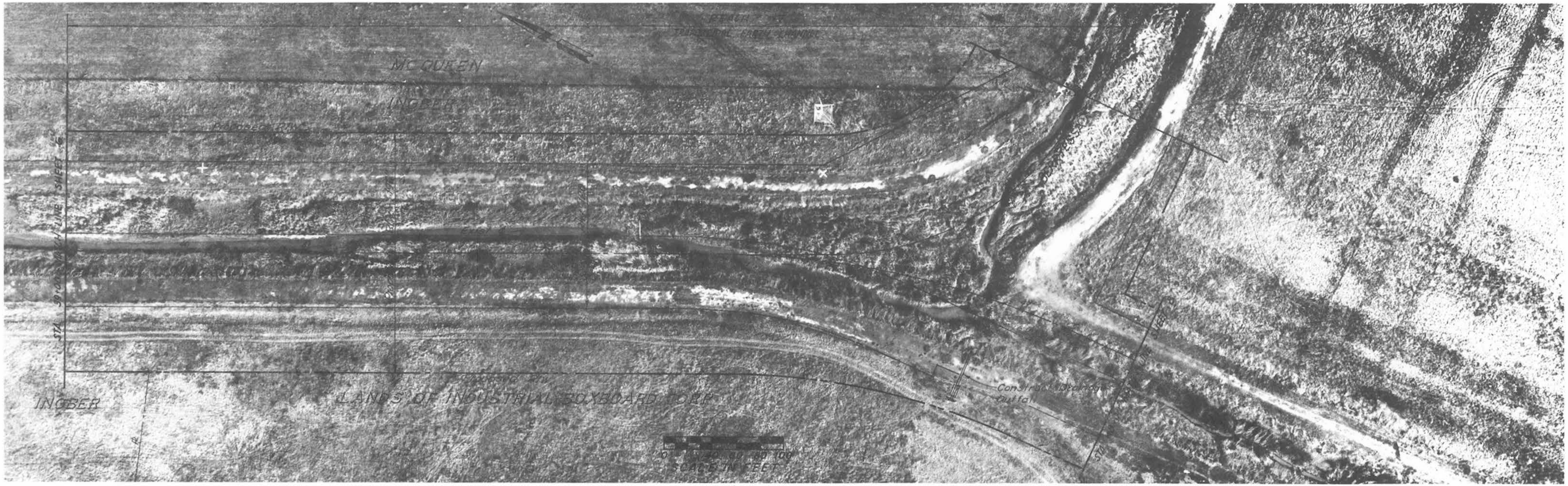
MAP AND GENERAL PLANS

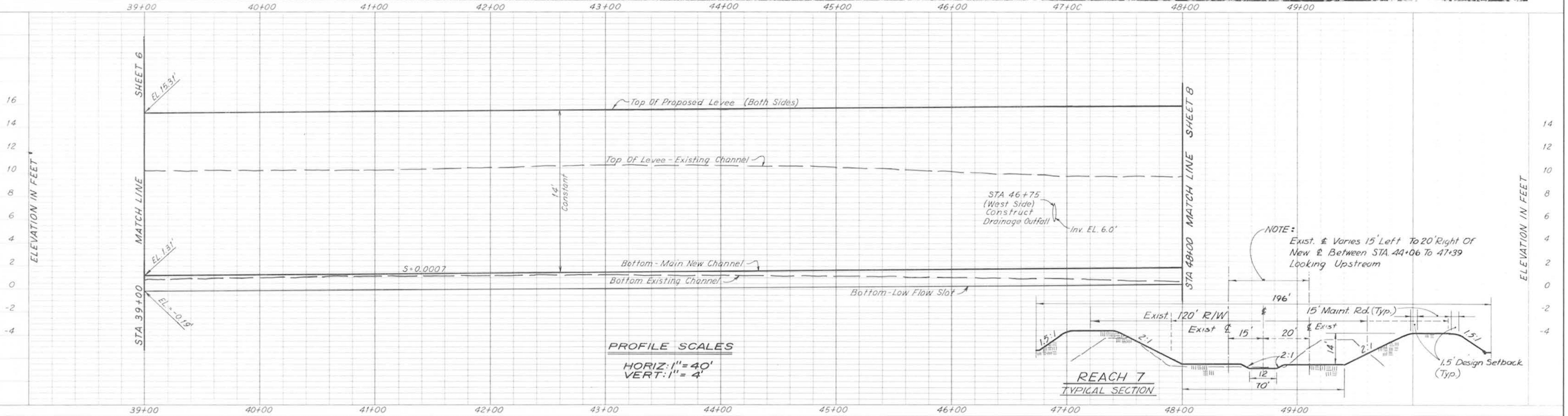
ZONE E-1 (EAST) PROJECT NO. 40033

PENITENCIA CREEK
(LOWER)

SCALE AS SHOWN

SHEET 6 of 11


REACH
MC QUEEN
INGBER
STA 39+00 MATCH LINE SHEET 6
INGBER
LANDS OF INDUSTRIAL BOXBOARD CORP
Construct Drainage Outfall
0 20 40 60 80 100
SCALE IN FEET



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SANTA CLARA COUNTY FLOOD CONTROL
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ENGINEERING APPROVAL
Edwin Ferguson
HEAD, DESIGN BRANCH R.C.E. NO. 14455

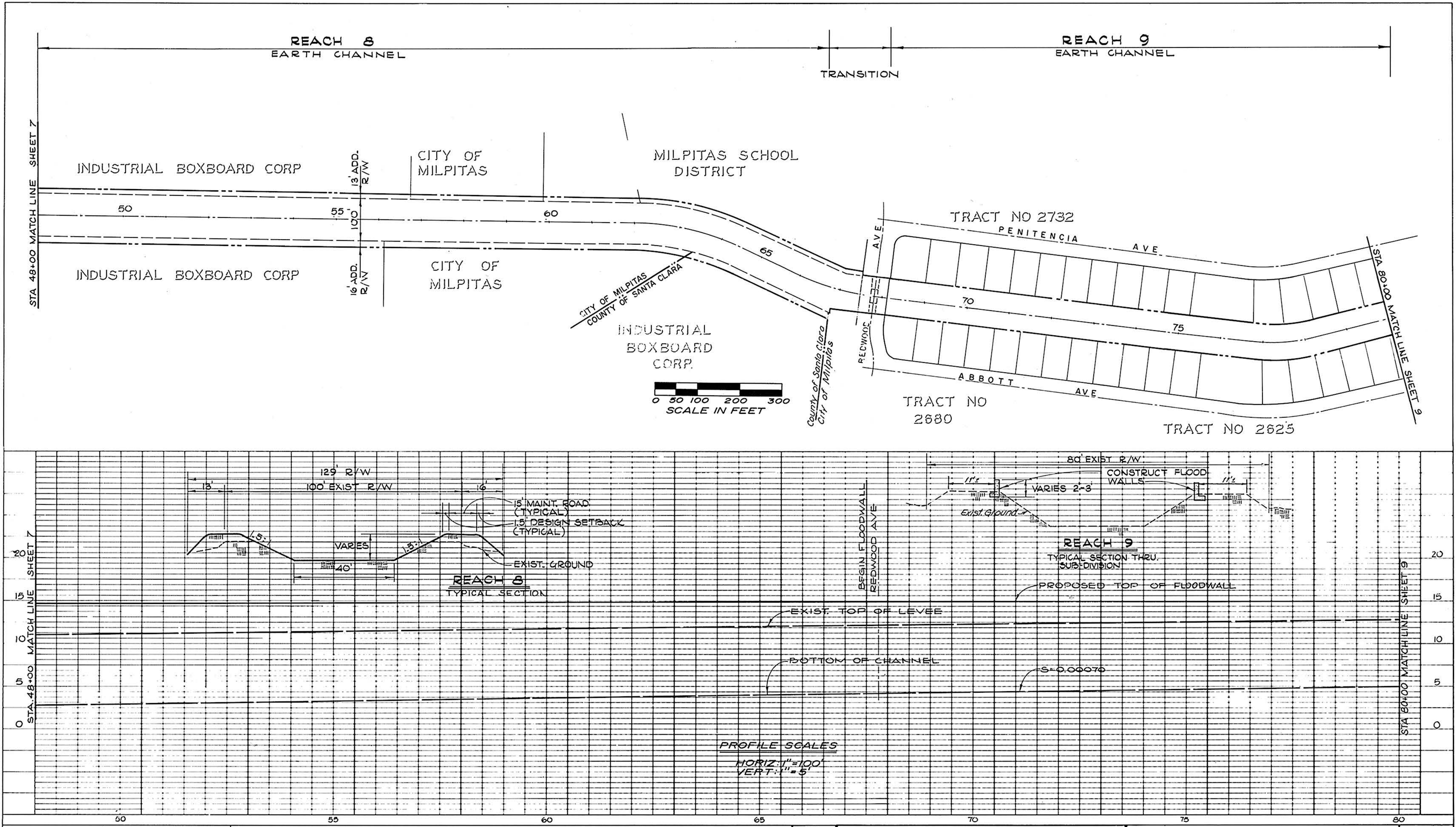
MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40033

PENITENCIA CREEK
(LOWER)

SCALE AS SHOWN

SHEET 7 of 11



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SANTA CLARA COUNTY FLOOD CONTROL
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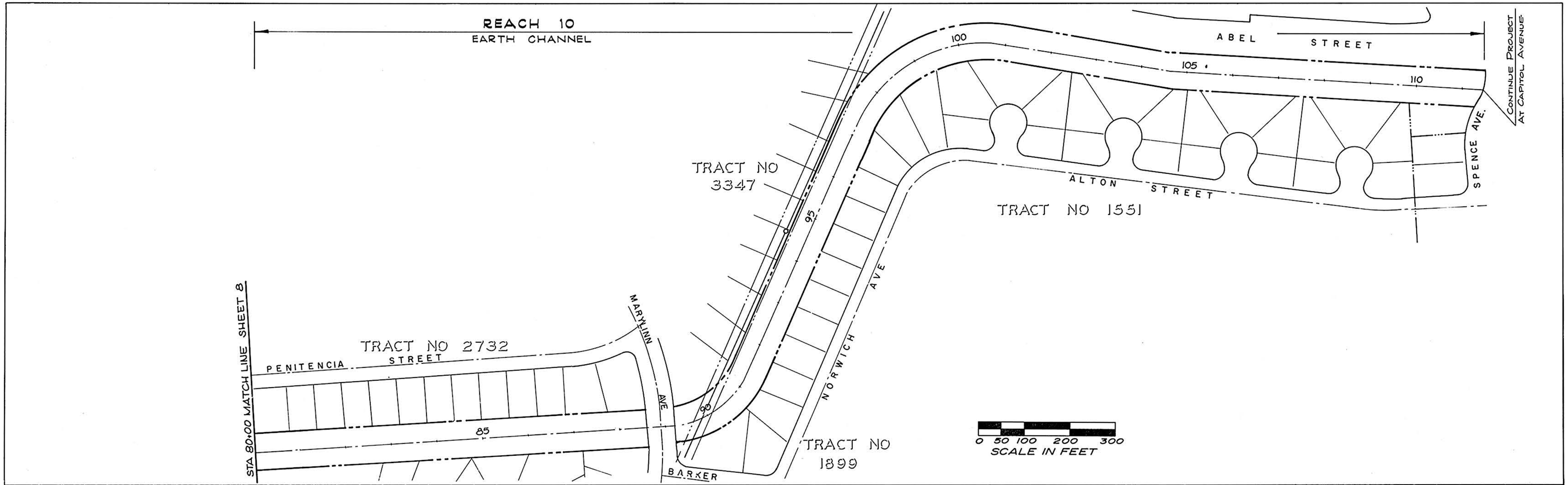
WATER DISTRICT

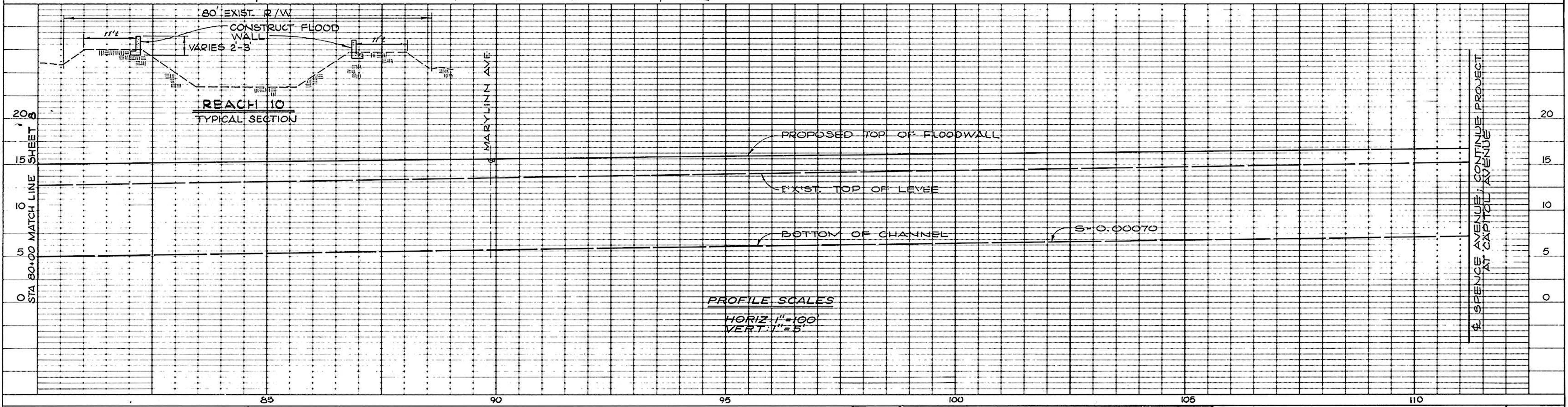
ENGINEERING CERTIFICATION
Robert Howard
PROJECT ENGINEER
DIVISION ENGINEER R.C.E. NO.

ENGINEERING APPROVAL
Edwin Ferguson
HEAD, DESIGN BRANCH R.C.E. NO. 14415

MAP AND GENERAL PLANS
ZONE E-1 (EAST) PROJECT NO. 40033
PENITENCIA CREEK
(LOWER)

SCALE AS SHOWN
SHEET 8
of 11





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SANTA CLARA COUNTY FLOOD CONTROL
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Robert Howard
PROJECT ENGINEER
DIVISION ENGINEER R.C.E. NO

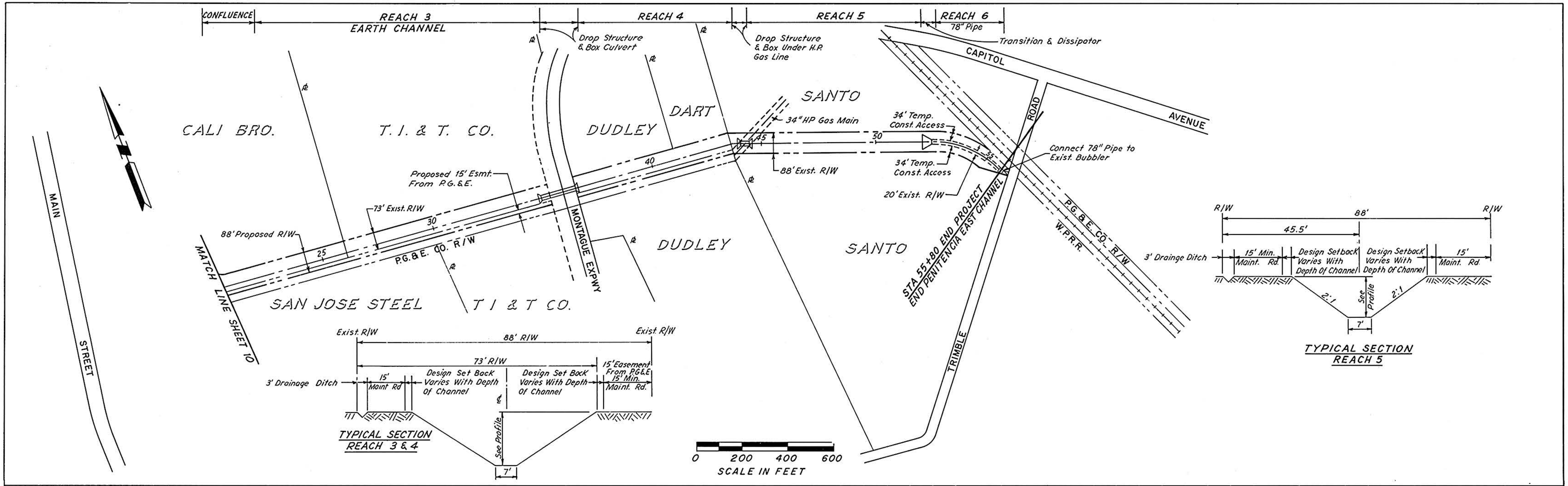
ENGINEERING APPROVAL
Edwin Ferguson
HEAD, DESIGN BRANCH R.C.E. NO. 14455

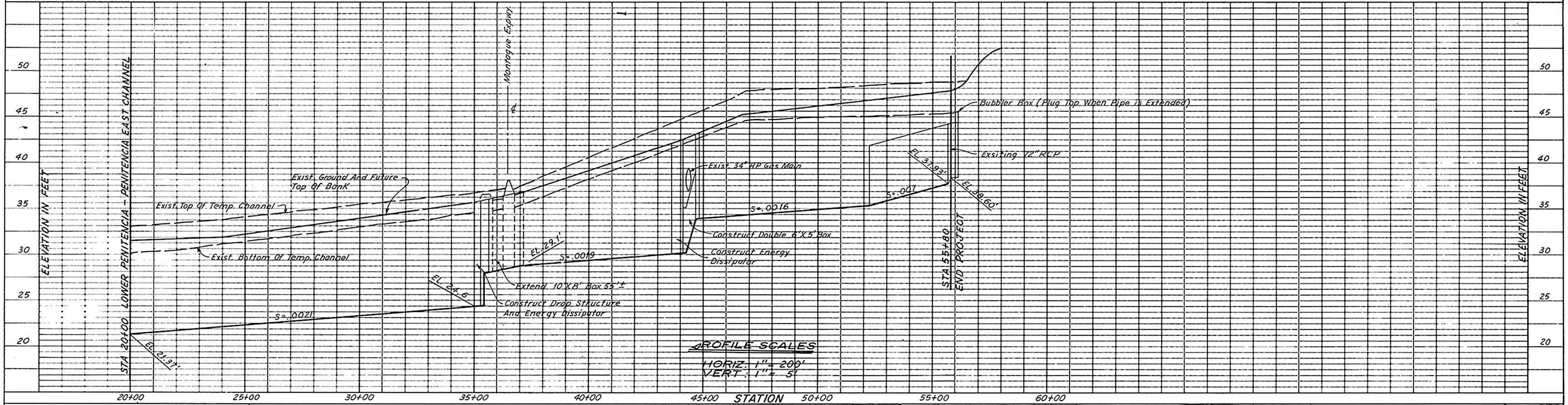
MAP AND GENERAL PLANS
ZONE E-1 (EAST) PROJECT NO. 40033

PENITENCIA CREEK
(LOWER)

SCALE AS SHOWN

SHEET 9 of 11





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DATE OF PHOTOGRAPHY

DATE
9-6-73
DESIGN
R.W.H.
DRAWN
R.R.G.
CHECKED
R.W.H.

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

ENGINEERING CERTIFICATION
Robert Howard
PROJECT ENGINEER
DIVISION ENGINEER R.C.E. NO.

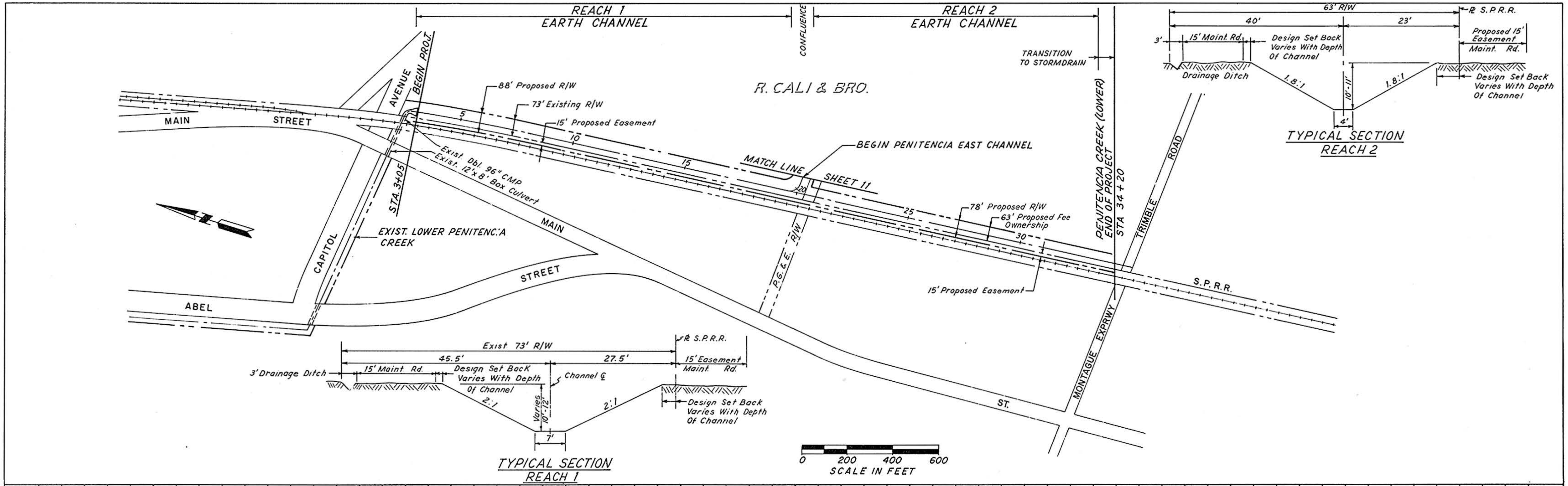
ENGINEERING APPROVAL
Edwin
HEAD, DESIGN BRANCH R.C.E. NO.

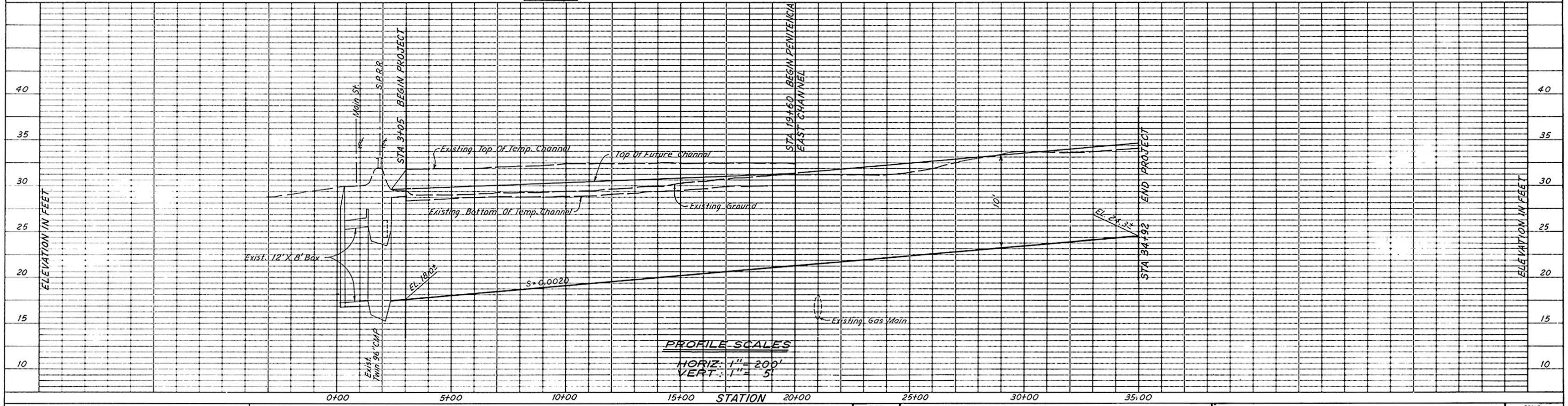
MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40049

PENITENCIA EAST CHANNEL

SCALE
AS SHOWN
SHEET
11
of 11





REFER TO TRACING FOR LATEST REVISION

REV	DESCRIPTION	SUB	APPR

NOTES

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DATE 9-6-73
DESIGN R.N.H.
DRAWN R.R.G.
CHECKED R.W.H.

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

ENGINEERING CERTIFICATION
Robert Howard
PROJECT ENGINEER
DIVISION ENGINEER R.C.E. NO.

ENGINEERING APPROVAL
Edwin Ferguson
HEAD, DESIGN BRANCH R.C.E. NO. 14455

MAP AND GENERAL PLANS
ZONE E-1 (EAST) PROJECT N 40033
PENITENCIA CREEK
(LOWER)

SCALE AS SHOWN
SHEET 10 of 11